

## **REMARKS**

### **Disposition of the Claims**

Claims 1-15 were pending as of the present Office Action, which states:

Claim 14 is objected to under 37 CFR 1.75;

Claims 1-3 and 5-10 are objected to;

Claims 1-3 and 5-10 are rejected under 35 U.S.C. § 102(a) over U.S. Patent No. 5,973,823 to Koops et al. (Koops '823');

Claims 1 and 4 are rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 4,900,113 to Hatori (Hatori); and

Claims 1, 2 and 6-15 are rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 4,743,087 to Utaka et al. (Utaka).

### **Drawings**

The Office Action dated December 18, 2002, does not indicate whether the drawings filed with the application have been accepted or are objected to. Applicants respectfully request clarification of this information.

### **Claim Amendments**

Claims 1, 4, 6, 9, and 11 have been amended to more particularly point out and distinctly claim the invention. Claims 2, 8, 10, and 15 have been amended to provide for consistency with the amended claims from which they respectively depend. Claim 13 has been amended to improve the form thereof. Claim 14 has been amended to overcome the objection thereof.

New claims 16-20 have been added to provide a more adequate basis for protection of the present invention. No new matter has been added.

**Claim Objections**

**Claim 14**

The objection to claim 14 under 37 C.F.R. 1.75 as being a substantial duplicate of claim 13 is respectfully traversed. By this amendment, claim 14 has been amended to depend from claim 13 rather than claim 12, thus differentiating claim 14 from claim 13 since claim 14, as amended, requires at least one additional waveguide portion as compared to claim 13. Accordingly, it is respectfully requested that the objection to claim 14 be reconsidered and withdrawn.

**Claims 1-3 and 5-10**

The objection to claims 1-3 and 5-10 is respectfully traversed. As discussed below, Koops '823 cannot anticipate claims 1, 6, and 9, as amended, or claims 2, 3, and 5 which depend from claim 1, claims 7 and 8 which depend from claim 6, and claim 10 which depends from claim 9. Accordingly, it is respectfully requested that the objection to claims 1-3 and 5-10 be reconsidered and withdrawn.

**35 U.S.C. § 102 Rejections**

**Claims 1-3 and 5-10 over Koops '823**

The rejection of claims 1-3 and 5-10 under 35 U.S.C. § 102(a) over Koops '823 is respectfully traversed based on the following.

Koops '823 discloses a filter comprising a plurality of dielectric needle-shaped crystals surrounded by optically-transparent filling material. The surrounding filling material is disclosed to have an adjustable refractive index, controlled according to the application of a voltage  $U_s$ . By applying voltage across the filter, the refractive index of the filling material is adjusted, and the filter can be tuned.

By this amendment, each of claims 1, 6, and 9 of the present application have been amended to recite *inter alia*:

**a periodic structure with a first refractive index portion and a plurality of second refractive index portions,  
wherein the second refractive index portions recur in a periodic pattern relative to the first refractive index portion, and  
wherein each recurrence of the second refractive index portion has a variable refractive index.<sup>1</sup>**

Thus, claims 1, 6, and 9 recite that the refractive index portion that recurs in a periodic pattern has a variable refractive index. This feature clearly distinguishes from Koops '823, in which it is the dielectric crystals that recur in a periodic pattern, but are not disclosed to have variable refractive indices. Therefore, since Koops '823 fails to disclose all of the limitations of claims 1, 6, and 9, Koops '823 cannot anticipate claims 1, 6, and 9, respectively. Likewise, Koops '823 cannot anticipate claims 2, 3, and 5 which depend from claim 1, claims 7 and 8 which depend from claim 6, and claim 10 which depends from claim 9.

Accordingly, it is respectfully requested that the rejection of claims 1-3 and 5-10 under 35 U.S.C. § 102(a) over Koops '823 be reconsidered and withdrawn.

Claims 1 and 4 over Hatori

The rejection of claims 1 and 4 under 35 U.S.C. § 102(b) over Hatori is respectfully traversed based on the following.

Hatori is directed towards a device that uses a transducer to induce surface waves across the surface of a wave guide, which Hatori discloses can be a Ti film or layer of piezoelectric material. A light wave travelling through the wave guide is diffracted by the surface waves.

Claim 1, as amended, recited *inter alia*:

a periodic structure with a first refractive index portion and a **plurality of second refractive index portions**,  
wherein the second refractive index portions **recur in a periodic pattern relative to the first refractive index portion**, and  
wherein each recurrence of the second refractive index portion **has a variable refractive index**.<sup>2</sup>

Thus, claim 1 requires a structure that includes a plurality of "second refractive index portions" that each have "a variable refractive index" recurring "in a periodic pattern relative to [a] first refractive index portion." Hatori is simply directed to inducing waves across a layer of material, such as a Ti film or piezo layer, and is silent with regard to having particular portions with variable refractive indices positioned in a periodic pattern. Therefore, since Hatori fails to disclose all of the limitations of claim 1, Hatori cannot anticipate claim 1, or claim 4 which depends from claim 1.

Accordingly, it is respectfully requested that the rejection of claims 1 and 4 under 35 U.S.C. § 102(b) over Hatori be reconsidered and withdrawn.

Claims 1, 2 and 6-15 over Utaka

The rejection of claims 1, 2 and 6-15 under 35 U.S.C. § 102(b) over Utaka is respectfully traversed based on the following.

Utaka is directed towards an optical modulation element that includes a DFB laser portion. The element also includes a portion having a waveguide, a diffraction grating, and an electrode. The output of the DFB laser is guided by the waveguide to the diffraction grating. However, depending on whether voltage is applied to the electrode, the refractive index of the waveguide shifts such that the output of the waveguide may or may not be passed by the diffraction grating.

As pointed out above, each of claims 1, 6, and 9 recite a refractive index portion that recurs in a periodic pattern having a variable refractive index. The waveguide used by

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<sup>1</sup> Emphasis added.

<sup>2</sup> Emphasis added.

Utaka, which is just a layer of InGaAsP material, clearly does not fulfill this requirement. The same holds true for claim 11, which, as amended, recites *inter alia*:

a periodic structure portion which has a periodic structure with a first refractive index portion and a plurality of second refractive index portions,  
wherein the second refractive index portions recur in a periodic pattern relative to the first refractive index portion, and  
wherein each recurrence of the second refractive index portion has a variable refractive index.

Therefore, since Utaka fails to disclose all of the limitations of claims 1, 6, 9, and 11, Utaka cannot anticipate claims 1, 6, 9, and 11 respectively. Likewise, Utaka cannot anticipate claim 2 which depends from claim 1, claims 7 and 8 which depend from claim 6, claim 10 which depends from claim 9, and claims 12-15 which depend from claim 11.

Accordingly, it is respectfully requested that the rejection of claims 1, 2 and 6-15 under 35 U.S.C. § 102(b) over Utaka Patent be reconsidered and withdrawn.

#### New Claims

New claims 16-20 have been added to provide a more adequate basis for protection of the present invention. Claim 16 is an independent claim, and claims 17-20 depend from claim 16. Claim 16 recites:

An optical functional device comprising:  
a periodic structure having a first refractive index portion and a plurality of second refractive index portions, the second refractive index portions recurring in a periodic pattern with respect to the first refractive index portion; and  
a controller for varying the refractive index of the plurality of second refractive index portions.

Thus, claim 16 is directed to a device that includes a structure having a plurality of "second refractive index portions...recurring in a periodic pattern" and "a controller for varying the refractive index of the second refractive index portions."

Claim 16 clearly distinguishes from Koops '823, Hatori, and Utaka, none of which discloses controlling refractive indices of particular portions that are positioned in a periodic pattern. Koops '823 discloses a filter with dielectric crystals dispersed within a surrounding filling material, wherein the refractive index of the filling material, not the dielectric crystals, is adjusted. Hatori and Utaka are each directed towards controlling the refractive index of a layer of material having no particular portions that are positioned in a periodic pattern.

### CONCLUSION

In view of the foregoing amendments and remarks, this application is considered to be in condition for allowance, and an early reconsideration and a Notice of Allowance are earnestly solicited.

This Amendment increases the number of independent claims by one from four to five and increases the total number of claims by five from fifteen to twenty, but does not present any multiple dependency claims. Accordingly, a Response Transmittal and Fee Authorization form authorizing the amount of \$84.00 to be charged to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260 is enclosed herewith in duplicate. However, if the Response Transmittal and Fee Authorization form is missing, insufficient, or otherwise inadequate, or if a fee, other than the issue fee, is required during the pendency of this application, please charge such fee to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260.

If an extension of time is required to enable this document to be timely filed and there is no separate Petition for Extension of Time filed herewith, this document is to be construed as also constituting a Petition for Extension of Time Under 37 C.F.R. § 1.136(a) for a period of time sufficient to enable this document to be timely filed.


Any other fee required for such Petition for Extension of Time and any other fee required by this document, other than the issue fee, and not submitted herewith should be

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Respectfully submitted,

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